

Alcohol Physiology and Pharmacology

Vermont Forensic Laboratory



Absorption

- Drink is consumed orally (typically)
- 10-20% of the alcohol is absorbed directly through the stomach wall.
- 80-90% is absorbed through the wall of the small intestine.
- Alcohol is a small molecule and does not require digestion to be absorbed.

What can affect absorption?

- Stomach emptying (opening of pyloric sphincter)
- Food
- Type of beverage
- Proof of liquor
- Gastric bypass
- Speed of consumption

What can affect absorption?

- In terms of a DUI, we are concerned with alcohol consumed within 30 minutes of operation.
- Some or all may still remain in the stomach.

Elimination

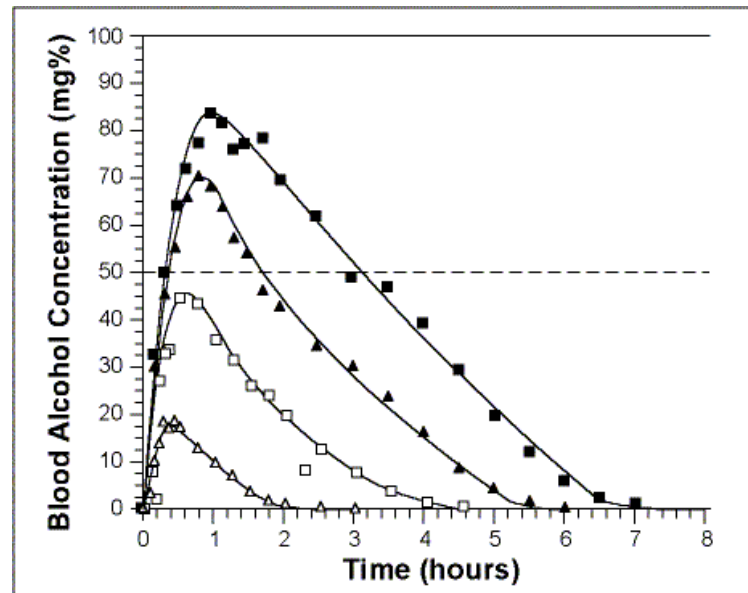
- Elimination: Includes excretion and the metabolic breakdown of ethanol.
- 97-98% of alcohol eliminated is through the breakdown into its metabolites via ADH.
- The effective dose of alcohol overwhelms the body's ability to metabolize it away. (Until levels reach below 0.01)

Elimination

- Excretion: 2-3% of the alcohol consumed is excreted via sweat, breath and urine.
- Excretion allows us to measure alcohol in a breath sample.

Elimination

- The rate of elimination is constant and not dose dependent.



Elimination

- Typical elimination: 0.018-0.022%/hour
- Range: 0.010-0.030%/hour
- Extreme cases: 0.065-0.075%/hour (estimates)
- 0.015%/hour used in calculations as it meets or underestimates the “true” elimination rate of a majority of the population.

What can affect Elimination?

- **Gender:** Women tend to eliminate faster
- **Experience:** Experienced drinkers eliminate faster.
- Person to person variability exists as well as inter-day variability for the same person.
- Some medications and fructose may affect elimination to a minor degree by increasing or decreasing the rate.

What does NOT affect elimination?

- Coffee
- Cold showers
- Exercise
- Sleep

Predicting BAC

- **Widmark Equation**: Used by chemists to determine the impact of a drink to a person's BAC.
- Based on type of beverage, weight and gender of individual.



The Standard Drink

- A standard drink is the equivalent dose of beer, wine and liquor which yield the same BAC.



The Myth of the Standard Drink

- Why is it a myth?
- Drinks are not always poured to the same amount.
- Alcohol concentrations of beer and wine vary.
- Home mixed drinks are substantially stronger than those served at an establishment.

The Myth of the Standard Drink

- A “standard” drink will be used by the chemist when no other information is given about what was actually consumed.
- Keep in mind that a beer is not a beer. There can be great variations.

Retrograde Extrapolation

- AKA Relation Back
- A calculation used by chemists to determine what an alcohol concentration would have been at an earlier point in time.
- Based on test result, time of test, time of operation and any drinking history available.

Retrograde Extrapolation

- The Widmark equation is used when drinking occurs after or within 30 minutes of operation.

4. OBSERVATION OF OPERATOR

Odor of intoxicants ☐ Strong ☐ Moderate ☐ Faint ☐ None
Eyes ☐ Watery ☐ Bloodshot ☐ Normal
Speech ☐ Unintelligible ☐ Mumbled ☐ Slurred ☐ Confused ☐ Normal

1. Have you consumed any alcoholic beverages?

☐ No ☐ Yes: How many? _____

★ 2. How long ago was your first drink? _____

★ 3. How long ago was your last drink? _____

★ 4. How much, if anything, have you had to drink in the last 30 minutes? _____

5. Have you consumed any drugs or medications? ☐ No ☐ Yes: What? _____

6. Other observations (e.g. alphabet, counting, etc.): _____

7. Difficulty getting out of vehicle? ☐ No ☐ Yes: Describe: _____

Standing ☐ Falling ☐ Extreme Sway ☐ Slight Sway ☐ Unsteady ☐ Steady

Walking ☐ Falling ☐ Stumbling ☐ Unsteady ☐ Steady

Alcoholic containers in vehicle? ☐ No ☐ Yes # _____ Types: _____ ☐ Full ☐ Empty ☐ None

IF OFFICER DID NOT OBSERVE THE DRIVING
(Whether crash or not) ASK: Did you drink any alcoholic beverage after
driving? No / Yes: How many? _____ ★

Retrograde extrapolation

7. INTERVIEW

Where were you driving to? _____

Where were you driving from (this time)? _____

How long ago did you drive from that location? _____

What food have you eaten in the last six hours? _____ How long ago did you eat that? _____

What have you been drinking? _____

☐ Beer ☐ Liquor ☐ Wine – Specific type (brand/name of drink) _____

How many drinks of each kind did you have? _____

How long ago did you start drinking? _____ How long ago did you stop drinking? _____

How much if anything did you drink in the 30 minutes before you were stopped driving? _____

Who were you drinking with? (**obtain names**) _____

Where (**specific location**) were you drinking? _____

How much do you weigh? _____

Are you tired? ☐ No ☐ Yes – Are you ill? ☐ No ☐ Yes, if so describe: _____

Do you have any physical handicaps? ☐ No ☐ Yes, if so describe: _____

Do you limp? ☐ No ☐ Yes Do you have diabetes? ☐ No ☐ Yes Taking insulin? ☐ No ☐ Yes

Do you have epilepsy? ☐ No ☐ Yes

Have you been injured lately? ☐ No ☐ Yes, if so describe: _____

Do you wear glasses? ☐ No ☐ Yes Do you wear contact lenses? ☐ No ☐ Yes

In the last 24 hours have you taken any medications or drugs? ☐ No ☐ Yes

Were the drugs/medications affecting your driving? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Please describe what drug/medication and the dosage/amount consumed? _____

Are you under the influence of drugs right now? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Are you under the influence of alcohol now? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Were you under the influence of drugs while driving the vehicle? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Were you under the influence of alcohol while driving the vehicle? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Were you feeling the effects of the alcohol while driving the vehicle? ☐ No ☐ Slightly ☐ Moderately ☐ Substantially

Have you been convicted of Driving Under the Influence in VT or any other State? ☐ No ☐ Yes

Are you currently on Probation? ☐ No ☐ Yes Are you currently on Conditions of Release? ☐ No ☐ Yes

OTHER QUESTIONS/ANSWERS (Re: DUI or any OTHER OFFENSES involved) use supplemental page.

Retrograde Extrapolation

A relation back calculation is required:

- 1) The test occurs more than 2 hours from the time of operation.
- 2) The test result is below a 0.080.
- 3) A drink has been consumed after or within 30 minutes of operation.

Requesting a Relation Back Affidavit

Scan and email or fax the following documents:

- 1) 4 page DUI processing forms
- 2) 1A Supplemental Affidavit
- 3) Evidence ticket(s)
- 4) Arrest custody report (or some document which contains the subject's weight)

Marcella.Giammanco@vermont.gov

or

241-5557 (fax)

Requesting a Relation Back Affidavit

- Ensure you include in your request a **valid email address** for the remittance of the completed affidavit and **your contact information** in case there are questions regarding the submission.
- Ensure that all information contained in your affidavit and supporting documents is accurate especially case number, subject's name, time of operation and time of test.